

Atty. Dkt. AMAT/5799/TCG/ALD/BG



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Wang, et al.

Serial No.: 10/084,767

Confirmation No.: UNKNOWN

Filed:

February 26, 2002

For:

Cyclical Deposition of **Tungsten Nitride for Metal**

Oxide Gate Electrode

Group Art Unit: UNKNOWN

Examiner:

UNKNOWN

Assistant Commissioner for **Patents**

Washington, D.C. 20231

CERTIFICATE OF MAILING 37 CFR 1.8

I hereby certify that this correspondence is being deposited on 2002 with the United States Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

Dear Sir:

INFORMATION DISCLOSURE STATEMENT

The Applicants, and the Attorney who signs below on the basis of the information supplied by the inventor and the information in his file, submit herewith patents, publications, or other information of which they are aware, which may be material to the examination of this application and in respect of which there may be a duty to disclose in accordance with 37 CFR § 1.56.

While the information submitted in this Information Disclosure Statement may be material pursuant to 37 CFR § 1.56, it is not intended to constitute an admission that any patent, publication, or other information referred to therein is prior art for this invention unless specifically designated as such.

In accordance with 37 CFR § 1.97, this Information Disclosure Statement is not to be construed as a representation that a search has been made or that no other possibly material information as defined under 37 CFR § 1.56(a) exists.

The patents and/or publications submitted herewith are set forth on the attached Form PTO-1449.

If the sum of \$180.00 is due under 37 CFR § 1.17(p) pursuant to § 1.97, the Commissioner is hereby authorized to charge this fee, and any other fee necessary Deposit Account No. make this submission timely, to the 0782/APPM/5799/BTP.

Respectfully submitted,

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tment of	Commerce, Paten	t and Trademar	k Office	Docket No.		Serial No.
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A1	4,058,430	11/15/77	Suntola et al.	156	611	11/25/75
A2	4,389,973	6/28/83	Suntola et al.	118	725	12/11/81
A3	4,413,022	11/1/83	Suntola et al.	427	255.2	6/21/79
A4	4,486,487	12/4/84	Skarp	428	216	4/25/83
A5	4,767,494	8/30/88	Kobayashi et a	l. 156	606	9/19/86
A6	4,806,321	2/21/89	Nishizawa et al	. 422	245	7/21/85
A7	4,813,846	3/21/89	Helms	414	744.1	4/29/87
A8	4,829,022	5/9/89	Kobayashi et a	l. 437	107	12/9/86
A9	4,834,831	5/30/89	Nishizawa et al	. 156	611	9/4/87
A10	4,838,983	6/13/89	Schumaker et al.	156	613	3/18/88
A11	4,838,993	6/13/89	Aoki et al.	156	643	12/3/87
A12	4,840,921	6/20/89	Matsumoto	437	89	6/30/88
A13	4,845,049	7/4/89	Sunakawa	437	81	3/28/88
A14	4,859,625	8/22/89	Nishizawa et a	I. 437	81	11/20/87
A15	4,859,627	8/22/89	Sunakawa	437	81	7/1/88
A16	4,861,417	8/29/89	Mochizuki et al	. 156	610	3/24/88
A17	4,876,218	10/24/89	Pessa et al.	437	107	9/26/88
A18	4,917,556	4/17/90	Stark et al.	414	217	5/26/89
A19	4,927,670	5/22/90	Erbil	427	255.3	6/22/88
A20	4,931,132	6/5/90	Aspnes et al.	156	601	10/7/88
A21	4,951,601	8/28/90	Maydan, et al.	118	719	6/23/89
A22	4,960,720	10/2/90	Shimbo	437	105	8/24/87
A23	4,975,252	12/4/90	Nishizawa et a	l. 422	245	5/26/89
A24	4,993,357	2/19/91	Scholz	118	715	12/21/89
A25	5,000,113	3/19/91	Wang et al.	118	723	12/19/86
A26	5,013,683	5/7/91	Petroff et al.	437	110	1/23/89
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	1449 m ENTAL APPLIC al sheets t Docum A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15 A16 A17 A18 A19 A20 A21 A22 A23 A24 A25	ENTAL LIST OF PATENTS APPLICANT STATE STA	### Table 18	Examiner Unknown Local Local	## APPM/5798 ## APPLICANT APPLICANT	## APPW/5799 APPLICANT ENTAL LIST OF PATENTS AND PUBLICATIONS APPLICANT

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	A27	5,028,565	7/2/91	Chang, et al.	437	192	8/25/89
	A28	5,082,798	1/21/92	Arimoto	437	108	9/27/90
	A29	5,085,885	2/4/92	Foley et al.	477	38	9/10/90
	A30	5,091,320	2/25/92	Aspnes et al.	437	8	6/15/90
	A31	5,130,269	7/14/92	Kitahara et al.	437	111	4/25/89
	A32	5,166,092	11/24/92	Mochizuki et al.	437	105	10/30/90
	A33	5,173,474	12/22/92	Connell, et al.	505	1	3/11/91
	A34	5,186,718	2/16/93	Tepman et al.	29	25.01	4/15/91
18.87	A35	5,205,077	4/27/93	Wittstock	51	165 R	8/28/91
· · · · · · · · · · · · · · · · · · ·	A36	5,225,366	7/6/93	Yoder	437	108	6/22/90
	A37	5,234,561	8/10/93	Randhawa et al	. 204	192.38	8/25/88
	A38	5,246,536	9/21/93	Nishizawa et al.	156	610	3/10/89
	A39	5,250,148	10/5/93	Nishizawa et al.	156	611	11/12/91
	A40	5,254,207	10/19/93	Nishizawa et al.	156	601	11/30/92
	A41	5,256,244	10/26/93	Ackerman	156	613	2/10/92
	A42	5,259,881	11/9/93	Edwards, et al.	118	719	5/17/91
	A43	5,270,247	12/14/93	Sakuma et al.	437	133	7/8/92
-	A44	5,278,435	1/11/94	Van Hove et al.	257	184	6/8/92
- NC)	A45	5,281,274	1/25/94	Yoder	118	697	2/4/93
	A46	5,286,296	2/15/94	Sato et al.	118	719	1/9/92
	A47	5,290,748	3/1/94	Knuuttila et al.	502	228	7/16/92
	A48	5,294,286	3/15/94	Nishizawa et al.	156	610	1/12/93
	A49	5,296,403	3/22/94	Nishizawa et al.	437	133	10/23/92
	A50	5,300,186	4/5/94	Kitahara et al.	156	613	4/7/92
	A51	5,311,055	5/10/94	Goodman et al.	257	593	11/22/91
	A52	5,316,615	5/31/94	Copel	117	95	3/9/93
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	A50 A51 A52	5,300,186 5,311,055 5,316,615	4/5/94 5/10/94 5/31/94	Kitahara et al. Goodman et al.	156 257 117 Date Cons	613 593 95 idered	4/7/92 11/22/91 3/9/93

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	A53	5,316,793	5/31/94	Wallace et al.	427	248.1	7/27/92
	A54	5,330,610	7/19/94	Eres et al.	117	86	5/28/93
	A55	5,336,324	8/9/94	Stall et al.	118	719	12/4/91
	A56	5,338,389	8/16/94	Nishizawa et al.	117	89	4/21/93
	A57	5,348,911	9/20/94	Jurgensen et al.	117	91	4/26/93
	A58	5,374,570	12/20/94	Nasu et al.	437	40	8/19/93
	A59	5,395,791	3/7/95	Cheng et al.	437	105	10/20/93
	A60	5,438,952	8/8/95	Otsuka	117	84	1/31/94
	A61	5,439,876	8/8/95	Graf et al.	505	447	8/16/93
	A62	5,441,703	8/15/95	Jurgensen	422	129	3/29/94
	A63	5,443,033	8/22/95	Nishizawa et al.	117	86	3/11/94
	A64	5,443,647	8/22/95	Aucoin et al.	118	723 ME	7/11/94
	A65	5,455,072	10/3/95	Bension et al.	427	255.7	11/18/92
	A66	5,458,084	10/17/95	Thorne et al.	117	89	12/9/93
, ,	A67	5,469,806	11/28/95	Mochizuki et al.	117	97	8/20/93
	A68	5,480,818	1/2/96	Matsumoto et al.	437	40	2/9/93
	A69	5,483,919	1/16/96	Yokoyama et al.	117	89	8/17/94
	A70	5,484,664	1/16/96	Kitahara et al.	428	641	1/21/94
	A71	5,503,875	4/2/96	Imai et al.	427	255.3	3/17/94
	A72	5,521,126	5/28/96	Okamura et al.	437	235	6/22/94
	A73	5,527,733	6/18/96	Nishizawa et al.	437	160	2/18/94
	A74	5,532,511	7/2/96	Nishizawa et al.	257	627	3/23/95
	A75	5,540,783	7/30/96	Eres et al.	118	725	5/26/94
	A76	5,580,380	12/3/96	Liu, et al.	117	86	1/30/95
**************************************	A77	5,601,651	2/11/97	Watabe	118	715	12/14/94
	A78	5,609,689	3/11/97	Kato et al.	118	719	6/3/96
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	A79	5,616,181	4/1/97	Yamamoto et al.	118	723 ER	11/21/95
	A80	5,637,530	6/10/97	Gaines et al.	114	105	6/10/96
	A81	5,641,984	6/24/97	Aftergut et al.	257	433	8/19/94
	A82	5,644,128	7/1/97	Wollnik et al.	250	251	8/25/94
	A83	5,667,592	9/16/97	Boitnott et al.	118	719	4/16/96
	A84	5,674,786	10/7/97	Turner et al.	437	225	6/5/95
	A85	5,693,139	12/2/97	Nishizawa et al.	. 117	89	6/15/93
	A86	5,695,564	12/9/97	Imahashi	118	719	8/3/95
	A87	5,705,224	1/6/98	Murota et al.	427	248.1	1/31/95
	A88	5,707,880	1/13/98	Aftergut et al.	437	3	1/17/97
	A89	5,711,811	1/27/98	Suntola et al.	118	711	11/28/95
	A90	5,730,801	3/24/98	Tepman et al.	118	719	8/23/94
	A91	5,730,802	3/24/98	Ishizumi et al.	118	719	12/27/96
	A92	5,747,113	5/5/98	Tsai	427	255.5	7/29/96
	A93	5,749,974	5/12/98	Habuka et al.	118	725	7/13/95
	A94	5,788,447	8/4/98	Yonemitsu et al	. 414	217	8/5/96
	A95	5,788,799	8/4/98	Steger, et al.	156	345	6/11/96
	A96	5,796,116	8/18/98	Nakata et al.	257	66	7/25/95
	A97	5,801,634	9/1/98	Young et al.	340	635	9/8/97
	A98	5,807,792	9/15/98	Ilg et al.	438	758	12/18/96
 	A99	5,830,270	11/3/98	McKee et al.	117	106	8/5/96
	A100	5,835,677	11/10/98	Li et al.	392	401	10/3/96
	A101	5,851,849	12/22/98	Comizzoli et al.	438	38	5/22/97
	A102	5,855,675	1/5/99	Doering et al.	118	719	3/3/97
	A103	5,855,680	1/5/99	Soininen et al.	118	719	11/28/95
	A104	5,856,219	1/5/99	Naito et al.	438	241	8/18/97
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	A105	5,858,102	1/12/99	Tsai	118	719	2/14/98
	A106	5,866,213	2/2/99	Foster et al.	427	573	7/19/97
	A107	5,866,795	2/2/99	Wang et al.	73	1.36	3/17/97
	A108	5,879,459	3/9/99	Gadgil et al.	118	715	8/29/97
	A109	5,882,165	3/16/99	Maydan et al.	414	217	9/10/97
	A110	5,882,413	3/16/99	Beaulieu et al.	118	719	7/11/97
	A111	5,904,565	5/18/99	Nguyen, et al.	438	687	7/17/97
	A112	5,916,365	6/29/99	Sherman	117	92	8/16/96
	A113	5,923,056	7/13/99	Lee et al.	257	192	3/12/98
	A114	5,923,985	7/13/99	Aoki et al.	438	301	1/14/97
	A115	5,925,574	7/20/99	Aoki et al.	437	31	4/10/92
	A116	5,928,389	7/27/99	Jevtic	29	25.01	10/21/96
	A117	5,942,040	8/24/99	Kim et al.	118	726	8/27/97
	A118	5,947,710	9/7/99	Cooper, et al.	418	63	6/16/97
	A119	5,972,430	10/26/99	DiMeo, Jr. et al.	427	255.32	11/26/97
	A120	6,001,669	12/14/99	Gaines et al.	438	102	7/21/92
	A121	6,015,590	1/18/00	Suntola et al.	427	255.23	11/28/95
	A122	6,025,627	2/15/00	Forbes et al.	257	321	5/29/98
	A123	6,036,773	3/14/00	Wang et al.	117	97	3/27/97
	A124	6,042,652	3/28/00	Hyun et al.	118	719	9/7/99
	A125	6,043,177	3/28/00	Falconer et al.	502	4	1/21/97
	A126	6,051,286	4/18/00	Zhao et al.	427	576	8/22/97
	A127	6,062,798	5/16/00	Muka	414	416	6/13/96
	A128	6,071,808	6/6/00	Merchant et al.	438	633	6/23/99
	A129	6,084,302	7/4/00	Sandhu	257	751	12/26/95
	A130	6,086,677	7/11/00	Umotoy et al.	118	715	6/16/98
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	A133	6,117,244	9/12/00	Bang, et al.	118	715	3/24/98
	A134	6,124,158	9/26/00	Dautartas et al.	438	216	6/8/99
	A135	6,130,147	10/10/00	Major et al.	438	604	3/18/97
	A136	6,139,700	10/31/00	Kang et al.	204	192.17	9/30/98
	A137	6,140,237	10/31/00	Chan et al.	438	687	4/19/99
	A138	6,140,238	10/31/00	Kitch	438	687	4/21/99
	A139	6,143,659	11/7/00	Leem	438	688	8/27/98
	A140	6,144,060	11/7/00	Park et al.	257	310	7/31/98
	A141	6,158,446	12/12/00	Mohindra et al.	134	25.4	9/4/98
	A142	6,174,377	1/16/01	Doering, et al.	118	729	1/4/99
	A143	6,174,809	1/16/01	Kang, et al.	438	682	12/15/98
	A144	6,200,893	3/13/01	Sneh	438	685	3/11/98
2,18	A145	6,203,613	3/20/01	Gates, et al.	117	104	10/19/99
	A146	6,206,967	3/27/01	Mak, et al.	118	666	6/14/00
	A147	6,207,302	3/27/01	Sugiura, et al.	428	690	3/2/98
	A148	6,248,605	6/19/01	Harkonen, et al.	438	29	6/2/99
	A149	6,270,572	8/7/01	Kim, et al.	117	93	8/9/99
	A150	6,271,148	8/7/01	Kao et al.	438	727	10/13/99
	A151	6,287,965	9/11/01	Kang, et al.	438	648	2/23/00
	A152	6,291,876	9/18/01	Stumborg, et al.	257	632	8/20/98
	A153	6,305,314	10/23/01	Sneh, et al.	118	723 R	12/17/99
	A154	6,306,216	10/23/01	Kim, et al.	118	725	7/12/00
	A155	6,316,098	11/13/01	Yitzchaik, et al.	428	339	3/23/99
	A156	2001/0042799	11/22/01	Kim, et al.	239	553	2/2/01
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	A157	2001/0041250	11/15/01	Werkhoven et al.	428	212	3/6/01
	A158	2001/0034123	10/25/01	Jeon, et al.	438	643	4/6/01
	A159	2001/0031562	10/18/01	Raaijmakers et al.	438	770	2/22/01
	A160	2001/0011526	8/9/01	Doering, et al.	118	729	1/16/01
	A161	2001/0009140	7/26/01	Bondestam, et al.	118	725	1/25/01
	A162	2001/0000866	5/10/01	Sneh, et al.	118	723 R	11/29/00
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CITED BT	AFFER	/AI41	JUN 1 1 20	R H	Wang, et a	al.	Unknown	
(Use sever	al sheet	s if necessary)	P Jun .	OEE!	Filing Date	•	Group	
		Examiner Unkn	own RADEN	ARI	02/26/200	2	Unknown	
Foreign Pa	atent Do	ocuments						
*Examiner Initial		Document Number	Date	Country	Class	Subclass	Transla YES	tion
	B1	196 27 017A1	1/9/97	DE	H01L	21/283		$\top \boxtimes$
	B2	198 20 147A1	7/1/99	DE	H01L	21/3205		
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	B4	0 799 641 A2	10/8/97	EP	B01J	20/32		
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	B10	58-098917	6/13/83	JP	H01L	21/205		
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	B14	61-210623	9/18/86	JP	H01L	21/205	\boxtimes	
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(PTO Form	n 1449 i	modified)			APPM/57	99	10/084,76	7
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Foreign Pa	atent D	ocuments		RADEMARK			<u>. </u>	
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	B34	64-082617	3/28/89	JP	H01L	21/205		
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	B39	01-103996	4/21/89	JP	C30B	29/40	\boxtimes	
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	B41	01-143221	6/5/89	JP	H01L	21/314	\boxtimes	
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(PTO Form	1449 n	nodified)			APPM/579	9	10/084,767	,
		LIST OF PATEN	TS AND PUBL	CATIONS	Applicant		Confirmatio	n No.:
CITED BY	APPLIC	ANI		50,05	Wang, et a	al.	Unknown	
(Use sever	al sheet	s if necessary)	MUL SE	1 1 2002	Filing Date)	Group	
		Examiner Unk	nown 🕏	, et d	02/26/2002	2	Unknown	
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	B53	01-305894	12/11/89	JP	C30B	23/08	\boxtimes	
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	B57	02-017634	1/22/90	JP	H01L	21/225		
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	B60	02-074587	3/14/90	JP	C30B	23/08	\boxtimes	
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	B70	02-264491	10/29/90	JP	H01S	18-Mar		
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SUPPLEM CITED BY	ENTAL	LIST OF PATEN	ITS AND PUBL	FATIONS	Applicant		Confirmation	on No.
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Examiner nitial		Document Number	Date	Country	Class	Subclass	Transla	Ţ <u> </u>
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	B73	03-022569	1/30/91	JP	H01L	29/804		+ <u> </u>
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	B89	04-111418	4/13/92	JP	H01L	21/205		
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(PTO Form	1449 mo	dified)			APPM/579	9	10/084,767	7
		IST OF PATENT	S AND PUBLI	CATIONS	Applicant		Confirmation	n No.:
CITED BY	APPLICA	AN I		011 2 40	Wang, et a	al.	Unknown	
(Use sever	al sheets	if necessary)	h .1	UN 1 1 2002 1	Filing Date)	Group	
	Ex	aminer Unkn	127 ,	UN 1 1 2002 1	02/26/200	2	Unknown	
Foreign Pa	atent Doc	uments		TRADEMAR				
*Examiner Initial		Document Number	Date	Country	Class	Subclass	Translat YES	tion NO
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	B98	04-273120	9/29/92	JP	H01L	21/20		늄
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	B101	04-325500	11/13/92	JP	C30B	33/00		$+\overline{\Box}$
	B102	04-328874	11/17/92	JP	H01L	29/804		十一
	B103	05-029228	2/5/93	JP	H01L	21/205		
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	B110	05-160152	6/25/93	JP	H01L	21/336	\boxtimes	
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Examiner					Date Con	sidered		

^{*}EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant.

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(PTO Form 1449 modified)					APPM/57	APPM/5799		10/084,767	
SUPPLEMENTAL LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT					Applicant	Applicant		Confirmation No.:	
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Foreign P	atent Do	cuments	· Ve	RADEMAR			1		
*Examiner Initial		Document Number	Date	Country	Class	Subclass	Transla		
	B121	05-291152	11/5/93	JP	H01L	21/205	YES	NO	
	B121	05-304334	11/16/93	JP	H01L	18-Mar		\perp	
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	B135	07-070752	3/14/95	JP	C23C	16/40	\boxtimes	T 📑	
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SUPPLEMENTAL LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT					Applicant		Confirmation No.:	
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1	B167	2001-303251	10/31/01	JP	C23C	16/44		
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^{*}EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant.

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(PTO Form 1449 modified)						APPM/5799		10/084,767	
SUPPLEMENTAL LIST OF PATENTS AND PUBLICATIONS CITED BY APPLICANT					Applicant	Applicant		Confirmation No.:	
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	Examiner Unknown Foreign Patent Documents					02/26/2002		Unknown	
Foreign Pa	atent Do	cuments	AC.	TRADEMAL			1		
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	B174	98/06889	2/19/98	WO	D06F				
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^{*}EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant.

U.S. Department of Commerce, Patent and Trademark Office				Docket No.	Serial No.		
(PTO Form 1449 modified)				APPM/5799	10/084,767		
		LIST OF PATENTS AND	Applicant	Confirmation No.:			
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 	C34	Abstracts of articles re atomic layer deposition and at	omic layer nucleation				
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